MTH 310: HW 1

Your Name

Due: May 23, 2018

1. **(Hungerford 1.1.2)** Find the quotient q and remainder r when a is divided by b.
   (a) $a = -51$; $b = 6$
   (b) $a = 302$; $b = 19$
   (c) $a = 2000$; $b = 17$

   Solution. Your solution here

2. **(Hungerford 1.1.7)** Use the Division Algorithm to prove that the square of any integer a is either of the form $3k$ or of the form $3k + 1$ for some integer k.

   Solution. Your solution here

3. **(Hungerford 1.1.10)** Let n be a positive integer. Prove that a and c leave the same remainder when divided by n if and only if $a - c = nk$ for some integer k.

   Solution. Your solution here

4. **(Hungerford 1.2.9)** If $a|c$ and $b|c$, must $ab|c$? Justify your answer.

   Solution. Your solution here

5. **(Hungerford 1.2.11)** If $n \in \mathbb{Z}$, what are the possible values of
   (a) $(n, n + 2)$
   (b) $(n, n + 6)$

   Solution. Your solution here

6. Prove that if k is a positive odd integers, then any sum of k consecutive integers is divisible by k.

   Solution. Your solution here

7. **(Hungerford 1.2.20)** Prove that $(a, b) = (a, b + at)$ for every $t \in \mathbb{Z}$.

   Solution. Your solution here

8. **(Hungerford 1.2.28)** Prove that a positive integer is divisible by 3 if and only if the sum of its digits is divisible by 3. [*Hint*: $10^3 = 999 + 1$ and similarly for other powers of 10.]

   Solution. Your solution here

9. **(Hungerford 1.2.34)** Prove that

   (a) $(a, b) | (a + b, a - b)$;

   (b) if a is odd and b is even, then $(a, b) = (a + b, a - b)$.

   Solution. Your solution here